PROJECT MEMORANDUM

DATE: July 7, 1993

TO: Joe Depner, Hydrogeologist

FROM: Nels Cone, Chemist NSC

SUBJECT: DATA VALIDATION OF ANALYTICAL RESULTS FROM PIER 91 RCRA FACILITY INVESTIGATION, PROJECT 624878, DATA SET #9B1-9B3

During the period of January 22 to February 4, 1993, nine soil samples and one water sample, were collected by Burlington Environmental Inc. personnel. These samples were submitted to Sound Analytical Services of Tacoma, Washington for volatile organic (EPA SW-846 Method 8240), semivolatile organic (EPA SW-846 Method 8270), and Total Petroleum Hydrocarbon (EPA SW-846 Methods 418.1 and 8015) analyses (work orders 29796, 29979, 30379, and 30488). I performed a review of the analytical results for the samples listed below.

CP-106B-2-4	CP-106B-18-20	CP-106B-39-41	CP-115B-38-40	CP-122B-32-36
CP-106B-6-8	CP-106B-35-37	CP-115B-18-20	CP-122A-DW	CP-122B-39-41

Properly completed chain-of-custody forms were included, along with signatures from field to laboratory receipt. The samples were shown as having been properly iced and received in good condition. Holding times were evaluated according to regulatory protocol (*National Functional Guidelines for Organic Data Review*, USEPA, 1990). Instances when holding times did not meet required guidelines are noted below. The samples received the analyses required by the Quality Assurance Project Plan (QAPP), and laboratory extraction/analysis times met the established guidelines. Proper data qualifier flags were used by the laboratory with the exceptions noted below.

Data Set 9B1:

For volatile analysis, all sample holding times met required guidelines with the exception of samples CP-115B-18-20, CP-115B-38-40, CP-106B-35-37, and CP-106B-39-41. As such, all results from these samples must be considered estimates and should have "J" flags appended to them. The method blanks contained methylene chloride, acetone, and toluene; results did not always receive the proper "B" data qualifier flag. All surrogate recoveries were within required quality control (QC) limits. Matrix spike/matrix spike duplicate analyses demonstrated appropriate analytical accuracy and relative percent differences (RPD) between the two analyses indicate acceptable analytical precision. Several samples required dilution, resulting in a corresponding increase in reported quantitation limits (PQLs).

Data Set 9B2:

Prior to laboratory arrival, the holding times for semivolatile analyses of CP-115-38-40, CP-106B-35-37, CP-106B-39-41, CP-122B-32-36, and CP-122B-39-41 were exceeded. Results from these samples must be considered as estimates and should have "J" data qualifier flags appended to them. Both di-n-butylphthalate and bis(2-ethylhexyl)phthalate were detected in the method blanks; results for these analyses did not always receive the required "B" data qualifier flag. Surrogate recoveries for all samples were within QC limits except when samples required significant dilution. This dilution also resulted in elevated PQL's for several samples. Matrix spike/matrix spike duplicate analyses were within QC limits with the exception of 1,4-dichlorobenzene and 1,2,4-trichlorobenzene. Overall, analytical accuracy remains intact because these analyses were not detected in the samples. The RPDs indicate acceptable analytical precision. Finally, errors involving the use of data qualifier flags are noted for sample CP-106B-2-4. Specifically, the "J" data qualifier flags for results of anthracene and 4-nitophenol are not needed and should be removed.

Data Set 9B3:

Results from Total Petroleum Hydrocarbon analyses indicate that prior to laboratory arrival, the holding time was exceeded for sample CP-115B-38-40. Results from this sample must be considered as estimates and have "J" data qualifier flags appended to them. Surrogate recoveries were within required QC limits, except when samples required significant dilution. This dilution resulted in the instrument detection limit being exceeded for sample CP-106B-2-4. Also as above, the usability of the data remains intact. When duplicate analyses were performed, appropriate analytical precision is displayed. Matrix spike analyses indicate required analytical accuracy was achieved. The method blank analysis results met required QC criteria and no corrections were needed.

RECOMMENDATIONS

In order to satisfy the data quality objectives as defined in Table F-2 of the QAPP, the following actions should be taken. All reported detections of volatile compounds in sample CP-115B-18-20, CP-115B-38-40, CP-106B-35-37 and CP106B-39-41 should receive "J" data qualifier flags. All reported detections of methylene cholride, acetone, and toluene should receive "B" data qualifier flags. The "J" flags on anthracene and 4-nitrophenol results for sample CP-106B-2-4 should be removed. All reported detections of semivolatile compounds in samples CP-115B-38-40, CP-106B-35-37, CP-106B-39-41, CP-122B-32-36, and CP-122B-39-41 should receive "J" data qualifier flags. All reported detections of di-n-butylphthalate and bis(2-ethylhexyl)phthalate should receive "B" data qualifier flags. This data set can then be considered valid for its intended use.

NC/rlk/b48:2369b.mem

SOUND ANALYTICAL SERVICES, INC.

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206) 922-2310 - FAX (206) 922-5047

April 5, 1993

TO: Burlington Environmental Engineering

PROJECT NUMBER: 624878-7304

PROJECT NAME: Pier 91

LABORATORY WORK ORDER NUMBER: 29796

Samples were taken on 1/22/93 and 1/25/93, and were received at Sound on 1/26/93. Samples were analyzed for Volatile Organics in accordance with EPA SW-846 Method 8240, Semivolatile Organics in accordance with EPA SW-846 Method 8270, Total Petroleum Hydrocarbons in accordance with EPA SW-846 Method 8015 Modified, and Total Petroleum Hydrocarbons in accordance with EPA Method 418.1.

VOLATILE ORGANICS

Samples 29796-1 through 29796-4 were analyzed on 1/27/93 and 2/1/93. Methylene chloride and acetone were detected in the method blanks associated with this sample group at levels above the IDL. Where detected in the associated sample, results for these compounds were flagged B to indicate this.

Sample 29796-1 was diluted 1:2 prior to analysis to avoid introduction of sediment into the analytical system. Sample 29796-2 and 29796-3 were diluted 1:10 due to the high concentration of target and non-target analytes present in the samples.

All QC parameters were within acceptance limits.

SEMIVOLATILE ORGANICS

Sample 29796-1 was extracted on 1/26/93 and analyzed on 2/19/93. Samples 29796-2 through 29796-4 were extracted on 1/28/93 and analyzed on 2/19/93. bis(2-Ethylhexyl)phthalate was detected in the associated method blank for the soil matrix. Sample 29796-2 was diluted 1:50 and sample 29796-3 was diluted 1:10 prior to analysis due to the high concentration of target and non-target analytes present in the samples.

SOUND ANALYTICAL SERVICES, INC.

TO: Burlington Environmental Engineering

PROJECT NUMBER: 624878-7304

PROJECT NAME: Pier 91

LABORATORY WORK ORDER NUMBER: 29796

SEMIVOLATILE ORGANICS, Continued
The percent recoveries for phenol were below advisory limits in the blank spike/blank spike duplicate analyses. The percent recoveries for 1,2,4-trichlorobenzene and 1,4-dichlorobenzene were below advisory limits in the matrix spike/matrix spike duplicate analysis for sample 29796-4.

The surrogate recoveries for samples 29796-2 and 29796-3 could not be calculated due to the required sample dilutions. The surrogate recovery for phenol-d5 was below QC limits in sample 29796-1.

All other QC parameters were within acceptance limits.

TOTAL PETROLEUM HYDROCARBONS (MODIFIED 8015)
Samples 29796-1 through 29796-4 were extracted on 1/28/93 and analyzed on 1/28/93 through 1/31/93. The concentration of petroleum hydrocarbons present in sample 29796-2 exceeded the instrument calibration range. The contaminant present in samples 29796-2 and 29796-3 did not appear to be typical product. The surrogate recoveries for 1-chlorooctane in sample 29796-2 and o-terphenyl in samples 29796-2 and 29796-3 were outside QC limits due to the high concentrations of the contaminant present in these samples. All other QC parameters were within acceptance limits.

TOTAL PETROLEUM HYDROCARBONS (418.1)
Samples 29796-1 through 29796-4 were extracted on 1/27/93 and 1/28/93, and analyzed on 1/28/93. All quality control parameters were within acceptance limits.

SOUND ANALYTICAL SERVICES, INC.

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206)922-2310 - FAX (206)922-5047

Report To: Burlington Environmental, Technical Services Date: March 5, 1993

Report On: Analysis of Water & Soil Lab No.: 29796

IDENTIFICATION:
Sample received on 01-26-93
Project: 624878-7304 Pier 91

ANALYSIS:

Lab No. 29796-1 Client ID: CP-122A-DW (water)

Volatile Organics by Method 8240
Date Analyzed: 1-27-93

Compound	Concentration ug/l	PQL	Flag
Chloromethane	ND	20	
Bromomethane	ND	20	
Vinyl Chloride	ND	20	
Chloroethane	ND	20	
Methylene Chloride	28	10	B
Acetone	14	100	B, J
Carbon Disulfide	ND	10	
1,1-Dichloroethene	ND	10	
1,1-Dichloroethane	ND	10	
1,2-Dichloroethene (Total)	ND	10	
Chloroform	31	10	
1,2-Dichloroethane	ND	10	
2-Butanone	ND	50	
1,1,1-Trichloroethane	ND	10	
Carbon Tetrachloride	ND	10	
Vinyl Acetate	ND	50	
Bromodichloromethane	ND	10	
1,2-Dichloropropane	ND	10	
Cis-1,3-Dichloropropene	ND	10	
Trichloroethene	ND	10	
Dibromochloromethane	ND	10	
1,1,2-Trichloroethane	ND	10	

ND - Not Detected
PQL - Practical Quantitation Limit

Continued . . . .

SOUND ANALYTICAL SERVICES, INC.

Burlington Environmental, Technical Services
Project: 624878-7302 Pier 91

Lab No. 29796
March 5, 1993

Lab No. 29796-1 Client ID: CP-122A-DW (water)

8240 Continued . . .

Compound	Concentration ug/l	PQL	Flag
Benzene	ND	10	
Trans-1,3-Dichloropropene	ND	10	
Bromoform	ND	10	
4-Methyl-2-Pentanone	ND	50	
2-Hexanone	ND	10	
Tetrachloroethene	ND	10	
1,1,2,2-Tetrachloroethane	ND	10	
Toluene	ND	10	
Chlorobenzene	ND	10	
Ethyl Benzene	ND	10	
Styrene	ND	10	
Total Xylenes	ND	10	

ND - Not Detected
PQL - Practical Quantitation Limit

Volatile Surrogates

Surrogate Compound	Percent Recovery	Control Limits Water	Soil
Toluene - D8	101	88 - 110	81 - 117
Bromofluorobenzene	99	86 - 115	74 - 121
1,2-Dichloroethane-D4	97	76 - 114	70 - 121

Continued . . . .

SOUND ANALYTICAL SERVICES, INC.

Burlington Environmental, Technical Services
Project: 624878-7302 Pier 91

Lab No. 29796
March 5, 1993

Lab No. 29796-1 Client ID: CP-122A-DW (water)

Semivolatile Organics Per EPA SW-846 Method 8270
Date Extracted: 1-26-93
Date Analyzed: 2-19-93

Compound	Concentration ug/l	PQL	Flag
Phenol	ND	9.9	
bis(2-Chloroethyl) ether	ND	9.9	
2-Chlorophenol	ND	9.9	
1,3-Dichlorobenzene	ND	9.9	
1,4-Dichlorobenzene	ND	9.9	
Benzyl Alcohol	ND	20	
1,2-Dichlorobenzene	ND	9.9	
2-Methylphenol	ND	9.9	
bis(2-Chloroisopropyl)ether	ND	9.9	
4-Methylphenol	ND	9.9	
N-Nitroso-Di-N-propylamine	ND	9.9	
Hexachloroethane	ND	9.9	
Nitrobenzene	ND	9.9	
Isophorone	ND	9.9	
2-Nitrophenol	ND	9.9	
2,4-Dimethylphenol	ND	9.9	
Benzoic Acid	ND	50	
bis(2-Chloroethoxy)methane	ND	9.9	
2,4-Dichlorophenol	ND	9.9	
1,2,4-Trichlorobenzene	ND	9.9	
Naphthalene	ND	9.9	
4-Chloroaniline	ND	20	
Hexachlorobutadiene	ND	9.9	
4-Chloro-3-methylphenol	ND	20	

ND - Not Detected
PQL - Practical Quantitation Limit

Continued . . . .

SOUND ANALYTICAL SERVICES, INC.

Burlington Environmental, Technical Services
Project: 624878-7302 Pier 91

Lab No. 29796
March 5, 1993

Lab No. 29796-1 Client ID: CP-122A-DW (water)

EPA Method 8270 Continued

Compound	Concentration ug/l	PQL	Flag
2-Methylnaphthalene	ND	9.9	
Hexachlorocyclopentadiene	ND	9.9	
2,4,6-Trichlorophenol	ND	9.9	
2,4,5-Trichlorophenol	ND	9.9	
2-Chloronaphthalene	ND	9.9	
2-Nitroaniline	ND	50	
Dimethyl phthalate	ND	9.9	
Acenaphthylene	ND	9.9	
2,6-Dinitrotoluene	ND	9.9	
3-Nitroaniline	ND	50	
Acenaphthene	ND	9.9	
2,4-Dinitrophenol	ND	50	
4-Nitrophenol	ND	50	
Dibenzofuran	ND	9.9	
2,4-Dinitrotoluene	ND	9.9	
Diethylphthalate	ND	9.9	
4-Chlorophenyl phenyl ether	ND	9.9	
Fluorene	ND	9.9	
4-Nitroaniline	ND	50	
4,6-Dinitro-2-methylphenol	ND	50	
N-Nitrosodiphenylamine	ND	9.9	
4-Bromophenyl phenyl ether	ND	9.9	
Hexachlorobenzene	ND	9.9	
Pentachlorophenol	ND	50	
Phenanthrene	ND	9.9	
Anthracene	ND	9.9	
Di-n-butylphthalate	ND	9.9	

ND - Not Detected
PQL - Practical Quantitation Limit

Continued . . . .

SOUND ANALYTICAL SERVICES, INC.

Burlington Environmental, Technical Services
Project: 624878-7302 Pier 91

Lab No. 29796
March 5, 1993

Lab No. 29796-1 Client ID: CP-122A-DW (water)

EPA Method 8270 Continued

Compound	Concentration ug/kg	PQL	Flag
Fluoranthene	ND	9.9	
Pyrene	ND	9.9	
Butyl benzyl phthalate	ND	9.9	
3,3'-Dichlorobenzidine	ND	20	
Benzo(a)anthracene	ND	9.9	
Chrysene	ND	9.9	
bis(2-ethylhexyl)phthalate	ND	9.9	
Di-n-octyl phthalate	ND	9.9	
Benzo(b)fluoranthene	ND	9.9	
Benzo(k)fluoranthene	ND	9.9	
Benzo(a)pyrene	ND	9.9	
Indeno(1,2,3-cd)pyrene	ND	9.9	
Dibenz(a,h)anthracene	ND	9.9	
Benzo(g,h,i)perylene	ND	9.9	

ND - Not Detected
PQL - Practical Quantitation Limit

Semi-Volatile Surrogates

Surrogate Compound	Percent Recovery	Control Limits Water	Soil
Nitrobenzene - d_5	68	35 - 114	23 - 120
2-Fluorobiphenyl	70	43 - 116	30 - 115
p-Terphenyl-d_{14}	73	33 - 141	18 - 137
Phenol-d_6	1 X9	10 - 94	24 - 113
2-Fluorophenol	23	21 - 100	25 - 121
2,4,6-Tribromophenol	60	10 - 123	19 - 122

Continued. . . .

SOUND ANALYTICAL SERVICES, INC.

Burlington Environmental, Technical Services
Project: 624878-7302 Pier 91

Lab No. 29796
March 5, 1993

Lab No. 29796-1 Client ID: CP-122A-DW (water)

TPH Per EPA Method 418.1
Date Extracted: 1-27-93
Date Analyzed: 1-28-93

Parameter	Concentration, mg/l	Flag
Total Petroleum Hydrocarbons	< 1.0	

TPH Per EPA SW-846 Modified Method 8015
Date Extracted: 1-31-93
Date Analyzed: 1-31-93

Parameter	Concentration, mg/l	Flag
Total Petroleum Fuel Hydrocarbons	< 0.75	

SURROGATE RECOVERY, %	
1-chlorooctane	58
o-terphenyl	112

Continued . . . . .

SOUND ANALYTICAL SERVICES, INC.

Burlington Environmental, Technical Services
Project: 624878-7302 Pier 91

Lab No. 29796
March 5, 1993

Lab No. 29796-2 Client ID: CP-106B-2-4 (soil)

Volatile Organics by Method 8240
Date Extracted: 1-27-93
Date Analyzed: 2-1-93

Compound	Concentration ug/kg	PQL	Flag
Chloromethane	ND	4,000	
Bromomethane	ND	4,000	
Vinyl Chloride	ND	4,000	
Chloroethane	ND	4,000	
Methylene Chloride	ND	2,000	
Acetone	32,000	20,000	B
Carbon Disulfide	ND	2,000	
1,1-Dichloroethene	ND	2,000	
1,1-Dichloroethane	ND	2,000	
1,2-Dichloroethene (Total)	ND	2,000	
Chloroform	ND	2,000	
1,2-Dichloroethane	ND	2,000	
2-Butanone	ND	10,000	
1,1,1-Trichloroethane	ND	2,000	
Carbon Tetrachloride	ND	2,000	
Vinyl Acetate	ND	10,000	
Bromodichloromethane	ND	2,000	
1,2-Dichloropropane	ND	2,000	
Cis-1,3-Dichloropropene	ND	2,000	
Trichloroethene	ND	2,000	
Dibromochloromethane	ND	2,000	
1,1,2-Trichloroethane	ND	2,000	

ND - Not Detected
PQL - Practical Quantitation Limit

Continued . . . .

SOUND ANALYTICAL SERVICES, INC.

Burlington Environmental, Technical Services
Project: 624878-7302 Pier 91

Lab No. 29796
March 5, 1993

Lab No. 29796-2 Client ID: CP-106B-2-4 (soil)

8240 Continued . . .

Compound	Concentration ug/kg	PQL	Flag
Benzene	ND	2,000	
Trans-1,3-Dichloropropene	ND	2,000	
Bromoform	ND	2,000	
4-Methyl-2-Pentanone	ND	10,000	
2-Hexanone	ND	2,000	
Tetrachloroethene	ND	2,000	
1,1,2,2-Tetrachloroethane	ND	2,000	
Toluene	6,500	2,000	
Chlorobenzene	ND	2,000	
Ethyl Benzene	25,000	2,000	
Styrene	ND	2,000	
Total Xylenes	100,000	2,000	

ND - Not Detected
PQL - Practical Quantitation Limit

Volatile Surrogates

Surrogate Compound	Percent Recovery	Control Limits Water	Soil
Toluene - D8	103	88 - 110	81 - 117
Bromofluorobenzene	114	86 - 115	74 - 121
1,2-Dichloroethane-D4	105	76 - 114	70 - 121

Continued . . . .

SOUND ANALYTICAL SERVICES, INC.

Burlington Environmental, Technical Services
Project: 624878-7302 Pier 91

Lab No. 29796
March 5, 1993

Lab No. 29796-2 Client ID: CP-106B-2-4 (soil)

Semivolatile Organics Per EPA SW-846 Method 8270
Date Extracted: 1-28-93
Date Analyzed: 2-19-93

Compound	Concentration ug/kg	PQL	Flag
Phenol	ND	37,000	
bis(2-Chloroethyl) ether	ND	37,000	
2-Chlorophenol	ND	37,000	
1,3-Dichlorobenzene	ND	37,000	
1,4-Dichlorobenzene	ND	37,000	
Benzyl Alcohol	ND	74,000	
1,2-Dichlorobenzene	ND	37,000	
2-Methylphenol	ND	37,000	
bis(2-Chloroisopropyl)ether	ND	37,000	
4-Methylphenol	ND	37,000	
N-Nitroso-Di-N-propylamine	ND	37,000	
Hexachloroethane	ND	37,000	
Nitrobenzene	ND	37,000	
Isophorone	ND	37,000	
2-Nitrophenol	ND	37,000	
2,4-Dimethylphenol	ND	37,000	
Benzoic Acid	ND	180,000	
bis(2-Chloroethoxy)methane	ND	37,000	
2,4-Dichlorophenol	ND	37,000	
1,2,4-Trichlorobenzene	ND	37,000	
Naphthalene	29,000	37,000	J
4-Chloroaniline	ND	74,000	
Hexachlorobutadiene	ND	37,000	
4-Chloro-3-methylphenol	ND	74,000	

ND - Not Detected
PQL - Practical Quantitation Limit

Continued . . . .

SOUND ANALYTICAL SERVICES, INC.

Burlington Environmental, Technical Services
Project: 624878-7302 Pier 91

Lab No. 29796
March 5, 1993

Lab No. 29796-2 Client ID: CP-106B-2-4 (soil)

EPA Method 8270 Continued

Compound	Concentration ug/kg	PQL	Flag
2-Methylnaphthalene	44,000	37,000	
Hexachlorocyclopentadiene	ND	37,000	
2,4,6-Trichlorophenol	ND	37,000	
2,4,5-Trichlorophenol	ND	37,000	
2-Chloronaphthalene	ND	37,000	
2-Nitroaniline	ND	180,000	
Dimethyl phthalate	ND	37,000	
Acenaphthylene	ND	37,000	
2,6-Dinitrotoluene	ND	37,000	
3-Nitroaniline	ND	180,000	
Acenaphthene	15,000	37,000	J
2,4-Dinitrophenol	ND	180,000	
4-Nitrophenol	ND	180,000	J
Dibenzofuran	8,400	37,000	J
2,4-Dinitrotoluene	ND	37,000	
Diethylphthalate	ND	37,000	
4-Chlorophenyl phenyl ether	ND	37,000	
Fluorene	14,000	37,000	J
4-Nitroaniline	ND	180,000	
4,6-Dinitro-2-methylphenol	ND	180,000	
N-Nitrosodiphenylamine	ND	37,000	
4-Bromophenyl phenyl ether	ND	37,000	
Hexachlorobenzene	ND	37,000	
Pentachlorophenol	ND	180,000	
Phenanthrene	41,000	37,000	
Anthracene	ND	37,000	J
Di-n-butylphthalate	ND	37,000	

ND - Not Detected
PQL - Practical Quantitation Limit

Continued . . . .

Burlington Environmental, Technical Services
Project: 624878-7302 Pier 91

Lab No. 29796
March 5, 1993

Lab No. 29796-2 Client ID: CP-106B-2-4 (soil)

EPA Method 8270 Continued

Compound	Concentration ug/kg	PQL	Flag
Fluoranthene	14,000	37,000	J
Pyrene	16,000	37,000	J
Butyl benzyl phthalate	ND	37,000	
3,3'-Dichlorobenzidine	ND	74,000	
Benzo(a)anthracene	ND	37,000	
Chrysene	ND	37,000	
bis(2-ethylhexyl)phthalate	ND	37,000	
Di-n-octyl phthalate	ND	37,000	
Benzo(b)fluoranthene	ND	37,000	
Benzo(k)fluoranthene	ND	37,000	
Benzo(a)pyrene	ND	37,000	
Indeno(1,2,3-cd)pyrene	ND	37,000	
Dibenz(a,h)anthracene	ND	37,000	
Benzo(g,h,i)perylene	ND	37,000	

ND - Not Detected
PQL - Practical Quantitation Limit

Semi-Volatile Surrogates

Surrogate Compound	Percent Recovery	Control Limits Water	Soil
Nitrobenzene - d_5	X8	35 - 114	23 - 120
2-Fluorobiphenyl	X8	43 - 116	30 - 115
p-Terphenyl-d_{14}	X8	33 - 141	18 - 137
Phenol-d_6	X8	10 - 94	24 - 113
2-Fluorophenol	X8	21 - 100	25 - 121
2,4,6-Tribromophenol	X8	10 - 123	19 - 122

Continued. . . . .

SOUND ANALYTICAL SERVICES, INC.

Burlington Environmental, Technical Services
Project: 624878-7302 Pier 91

Lab No. 29796
March 5, 1993

Lab No. 29796-2 Client ID: CP-106B-2-4 (soil)

TPH Per EPA Method 418.1
Date Extracted: 1-28-93
Date Analyzed: 1-28-93

Parameter	Concentration, mg/kg	Flag
Total Petroleum Hydrocarbons	14,000	

TPH Per EPA SW-846 Modified Method 8015
Date Extracted: 1-29-93
Date Analyzed: 1-29-93

Parameter	Concentration, mg/kg	Flag
Total Petroleum Fuel Hydrocarbons	13,000	E, X2

TPH as Aged Gas, Diesel and Heavy Oil

SURROGATE RECOVERY, %		
1-chlorooctane	46	X10
o-terphenyl	157	X10

Continued . . . . .

SOUND ANALYTICAL SERVICES, INC.

Burlington Environmental, Technical Services
Project: 624878-7302 Pier 91

Lab No. 29796
March 5, 1993

Lab No. 29796-3 Client ID: CP-106B-6-8 (soil)

Volatile Organics by Method 8240
Date Extracted: 1-27-93
Date Analyzed: 2-1-93

Compound	Concentration ug/kg	PQL	Flag
Chloromethane	ND	5,000	
Bromomethane	ND	5,000	
Vinyl Chloride	ND	5,000	
Chloroethane	ND	5,000	
Methylene Chloride	ND	2,500	
Acetone	ND	25,000	
Carbon Disulfide	ND	2,500	
1,1-Dichloroethene	ND	2,500	
1,1-Dichloroethane	ND	2,500	
1,2-Dichloroethene (Total)	ND	2,500	
Chloroform	ND	2,500	
1,2-Dichloroethane	ND	2,500	
2-Butanone	ND	12,500	
1,1,1-Trichloroethane	ND	2,500	
Carbon Tetrachloride	ND	2,500	
Vinyl Acetate	ND	12,500	
Bromodichloromethane	ND	2,500	
1,2-Dichloropropane	ND	2,500	
Cis-1,3-Dichloropropene	ND	2,500	
Trichloroethene	ND	2,500	
Dibromochloromethane	ND	2,500	
1,1,2-Trichloroethane	ND	2,500	

ND - Not Detected
PQL - Practical Quantitation Limit

Continued . . . .

SOUND ANALYTICAL SERVICES, INC.

Burlington Environmental, Technical Services
Project: 624878-7302 Pier 91

Lab No. 29796
March 5, 1993

Lab No. 29796-3 Client ID: CP-106B-6-8 (soil)

8240 Continued . . .

Compound	Concentration ug/kg	PQL	Flag
Benzene	ND	2,500	
Trans-1,3-Dichloropropene	ND	2,500	
Bromoform	ND	2,500	
4-Methyl-2-Pentanone	ND	12,500	
2-Hexanone	ND	2,500	
Tetrachloroethene	ND	2,500	
1,1,2,2-Tetrachloroethane	ND	2,500	
Toluene	2,400	2,500	J
Chlorobenzene	ND	2,500	
Ethyl Benzene	22,000	2,500	
Styrene	ND	2,500	
Total Xylenes	80,000	2,500	

ND - Not Detected
PQL - Practical Quantitation Limit

Volatile Surrogates

Surrogate Compound	Percent Recovery	Control Limits Water	Soil
Toluene - D8	103	88 - 110	81 - 117
Bromofluorobenzene	108	86 - 115	74 - 121
1,2-Dichloroethane-D4	98	76 - 114	70 - 121

Continued . . . .

SOUND ANALYTICAL SERVICES, INC.

Burlington Environmental, Technical Services
Project: 624878-7302 Pier 91

Lab No. 29796
March 5, 1993

Lab No. 29796-3 Client ID: CP-106B-6-8 (soil)

Semivolatile Organics Per EPA SW-846 Method 8270
Date Extracted: 1-28-93
Date Analyzed: 2-19-93

Compound	Concentration ug/kg	PQL	Flag
Phenol	ND	7,900	
bis(2-Chloroethyl) ether	ND	7,900	
2-Chlorophenol	ND	7,900	
1,3-Dichlorobenzene	ND	7,900	
1,4-Dichlorobenzene	ND	7,900	
Benzyl Alcohol	ND	16,000	
1,2-Dichlorobenzene	ND	7,900	
2-Methylphenol	ND	7,900	
bis(2-Chloroisopropyl)ether	ND	7,900	
4-Methylphenol	ND	7,900	
N-Nitroso-Di-N-propylamine	ND	7,900	
Hexachloroethane	ND	7,900	
Nitrobenzene	ND	7,900	
Isophorone	ND	7,900	
2-Nitrophenol	ND	7,900	
2,4-Dimethylphenol	ND	7,900	
Benzoic Acid	ND	39,000	
bis(2-Chloroethoxy)methane	ND	7,900	
2,4-Dichlorophenol	ND	7,900	
1,2,4-Trichlorobenzene	ND	7,900	
Naphthalene	9,000	7,900	
4-Chloroaniline	ND	16,000	
Hexachlorobutadiene	ND	7,900	
4-Chloro-3-methylphenol	ND	16,000	

ND - Not Detected
PQL - Practical Quantitation Limit

Continued . . . .

SOUND ANALYTICAL SERVICES, INC.

Burlington Environmental, Technical Services
Project: 624878-7302 Pier 91

Lab No. 29796
March 5, 1993

Lab No. 29796-3 Client ID: CP-106B-6-8 (soil)

EPA Method 8270 Continued

Compound	Concentration ug/kg	PQL	Flag
2-Methylnaphthalene	15,000	7,900	
Hexachlorocyclopentadiene	ND	7,900	
2,4,6-Trichlorophenol	ND	7,900	
2,4,5-Trichlorophenol	ND	7,900	
2-Chloronaphthalene	ND	7,900	
2-Nitroaniline	ND	39,000	
Dimethyl phthalate	ND	7,900	
Acenaphthylene	ND	7,900	
2,6-Dinitrotoluene	ND	7,900	
3-Nitroaniline	ND	39,000	
Acenaphthene	5,400	7,900	J
2,4-Dinitrophenol	ND	39,000	
4-Nitrophenol	ND	39,000	
Dibenzofuran	3,300	7,900	J
2,4-Dinitrotoluene	ND	7,900	
Diethylphthalate	ND	7,900	
4-Chlorophenyl phenyl ether	ND	7,900	
Fluorene	5,400	7,900	J
4-Nitroaniline	ND	39,000	
4,6-Dinitro-2-methylphenol	ND	39,000	
N-Nitrosodiphenylamine	ND	7,900	
4-Bromophenyl phenyl ether	ND	7,900	
Hexachlorobenzene	ND	7,900	
Pentachlorophenol	ND	39,000	
Phenanthrene	16,000	7,900	
Anthracene	2,000	7,900	J
Di-n-butylphthalate	ND	7,900	

ND - Not Detected
PQL - Practical Quantitation Limit

Continued . . . .

Burlington Environmental, Technical Services
Project: 624878-7302 Pier 91

Lab No. 29796
March 5, 1993

Lab No. 29796-3 Client ID: CP-106B-6-8 (soil)

EPA Method 8270 Continued

Compound	Concentration ug/kg	PQL	Flag
Fluoranthene	5,600	7,900	J
Pyrene	6,100	7,900	J
Butyl benzyl phthalate	ND	7,900	
3,3'-Dichlorobenzidine	ND	16,000	
Benzo(a)anthracene	ND	7,900	
Chrysene	2,100	7,900	J
bis(2-ethylhexyl)phthalate	ND	7,900	
Di-n-octyl phthalate	ND	7,900	
Benzo(b)fluoranthene	1,400	7,900	J
Benzo(k)fluoranthene	1,600	7,900	J
Benzo(a)pyrene	ND	7,900	
Indeno(1,2,3-cd)pyrene	ND	7,900	
Dibenz(a,h)anthracene	ND	7,900	
Benzo(g,h,i)perylene	ND	7,900	

ND - Not Detected
PQL - Practical Quantitation Limit

Semi-Volatile Surrogates

Surrogate Compound	Percent Recovery	Control Limits Water	Soil
Nitrobenzene - d_5	X8	35 - 114	23 - 120
2-Fluorobiphenyl	X8	43 - 116	30 - 115
p-Terphenyl-d_{14}	X8	33 - 141	18 - 137
Phenol-d_6	X8	10 - 94	24 - 113
2-Fluorophenol	X8	21 - 100	25 - 121
2,4,6-Tribromophenol	X8	10 - 123	19 - 122

Continued. . . . .

SOUND ANALYTICAL SERVICES, INC.

Burlington Environmental, Technical Services
Project: 624878-7302 Pier 91

Lab No. 29796
March 5, 1993

Lab No. 29796-3 Client ID: CP-106B-6-8 (soil)

TPH Per EPA Method 418.1
Date Extracted: 1-28-93
Date Analyzed: 1-28-93

Parameter	Concentration, mg/kg	Flag
Total Petroleum Hydrocarbons	12,000	

TPH Per EPA SW-846 Modified Method 8015
Date Extracted: 1-28-93
Date Analyzed: 1-28-93

Parameter	Concentration, mg/kg	Flag
Total Petroleum Fuel Hydrocarbons	7,500	X2

TPH as Aged Gas, Diesel and Heavy Oil

SURROGATE RECOVERY, %		
1-chlorooctane	86	
o-terphenyl	156	X10

Continued . . . . .

SOUND ANALYTICAL SERVICES, INC.

Burlington Environmental, Technical Services
Project: 624878-7302 Pier 91

Lab No. 29796
March 5, 1993

Lab No. 29796-4 Client ID: CP-106B-18-20 (soil)

Volatile Organics by Method 8240
Date Analyzed: 2-1-93

Compound	Concentration ug/kg	PQL	Flag
Chloromethane	ND	500	
Bromomethane	ND	500	
Vinyl Chloride	ND	500	
Chloroethane	ND	500	
Methylene Chloride	420	250	B
Acetone	ND	2,500	
Carbon Disulfide	ND	250	
1,1-Dichloroethene	ND	250	
1,1-Dichloroethane	ND	250	
1,2-Dichloroethene (Total)	ND	250	
Chloroform	ND	250	
1,2-Dichloroethane	ND	250	
2-Butanone	ND	1,250	
1,1,1-Trichloroethane	ND	250	
Carbon Tetrachloride	ND	250	
Vinyl Acetate	ND	1,250	
Bromodichloromethane	ND	250	
1,2-Dichloropropane	ND	250	
Cis-1,3-Dichloropropene	ND	250	
Trichloroethene	ND	250	
Dibromochloromethane	ND	250	
1,1,2-Trichloroethane	ND	250	

ND - Not Detected
PQL - Practical Quantitation Limit

Continued . . . .

SOUND ANALYTICAL SERVICES, INC.

Burlington Environmental, Technical Services
Project: 624878-7302 Pier 91

Lab No. 29796
March 5, 1993

Lab No. 29796-4 Client ID: CP-106B-18-20 (soil)

8240 Continued . . .

Compound	Concentration ug/kg	PQL	Flag
Benzene	ND	250	
Trans-1,3-Dichloropropene	ND	250	
Bromoform	ND	250	
4-Methyl-2-Pentanone	ND	1,250	
2-Hexanone	ND	250	
Tetrachloroethene	ND	250	
1,1,2,2-Tetrachloroethane	ND	250	
Toluene	ND	250	
Chlorobenzene	ND	250	
Ethyl Benzene	77	250	J
Styrene	ND	250	
Total Xylenes	300	250	

ND - Not Detected
PQL - Practical Quantitation Limit

Volatile Surrogates

Surrogate Compound	Percent Recovery	Control Limits Water	Soil
Toluene - D8	106	88 - 110	81 - 117
Bromofluorobenzene	102	86 - 115	74 - 121
1,2-Dichloroethane-D4	96	76 - 114	70 - 121

Continued . . . .

SOUND ANALYTICAL SERVICES, INC.

Burlington Environmental, Technical Services
Project: 624878-7302 Pier 91

Lab No. 29796
March 5, 1993

Lab No. 29796-4 Client ID: CP-106B-18-20 (soil)

Semivolatile Organics Per EPA SW-846 Method 8270
Date Extracted: 1-26-93
Date Analyzed: 2-19-93

Compound	Concentration ug/kg	PQL	Flag
Phenol	ND	870	
bis(2-Chloroethyl) ether	ND	870	
2-Chlorophenol	ND	870	
1,3-Dichlorobenzene	ND	870	
1,4-Dichlorobenzene	ND	870	
Benzyl Alcohol	ND	1,700	
1,2-Dichlorobenzene	ND	870	
2-Methylphenol	ND	870	
bis(2-Chloroisopropyl)ether	ND	870	
4-Methylphenol	ND	870	
N-Nitroso-Di-N-propylamine	ND	870	
Hexachloroethane	ND	870	
Nitrobenzene	ND	870	
Isophorone	ND	870	
2-Nitrophenol	ND	870	
2,4-Dimethylphenol	ND	870	
Benzoic Acid	ND	4,300	
bis(2-Chloroethoxy)methane	ND	870	
2,4-Dichlorophenol	ND	870	
1,2,4-Trichlorobenzene	ND	870	
Naphthalene	ND	870	
4-Chloroaniline	ND	1,700	
Hexachlorobutadiene	ND	870	
4-Chloro-3-methylphenol	ND	1,700	

ND - Not Detected
PQL - Practical Quantitation Limit

Continued . . . .

SOUND ANALYTICAL SERVICES, INC.

Burlington Environmental, Technical Services
Project: 624878-7302 Pier 91

Lab No. 29796
March 5, 1993

Lab No. 29796-4 Client ID: CP-106B-18-20 (soil)

EPA Method 8270 Continued

Compound	Concentration ug/kg	PQL	Flag
2-Methylnaphthalene	ND	870	
Hexachlorocyclopentadiene	ND	870	
2,4,6-Trichlorophenol	ND	870	
2,4,5-Trichlorophenol	ND	870	
2-Chloronaphthalene	ND	870	
2-Nitroaniline	ND	4,300	
Dimethyl phthalate	ND	870	
Acenaphthylene	ND	870	
2,6-Dinitrotoluene	ND	870	
3-Nitroaniline	ND	4,300	
Acenaphthene	ND	870	
2,4-Dinitrophenol	ND	4,300	
4-Nitrophenol	ND	4,300	
Dibenzofuran	ND	870	
2,4-Dinitrotoluene	ND	870	
Diethylphthalate	ND	870	
4-Chlorophenyl phenyl ether	ND	870	
Fluorene	ND	870	
4-Nitroaniline	ND	4,300	
4,6-Dinitro-2-methylphenol	ND	4,300	
N-Nitrosodiphenylamine	ND	870	
4-Bromophenyl phenyl ether	ND	870	
Hexachlorobenzene	ND	870	
Pentachlorophenol	ND	4,300	
Phenanthrene	120	870	J
Anthracene	ND	870	
Di-n-butylphthalate	330	870	J

ND - Not Detected
PQL - Practical Quantitation Limit

Continued . . . .

SOUND ANALYTICAL SERVICES, INC.

Lab No. 29796-4 Client ID: CP-106B-18-20 (soil)

EPA Method 8270 Continued

Compound	Concentration ug/kg	PQL	Flag
Fluoranthene	ND	870	
Pyrene	ND	870	
Butyl benzyl phthalate	ND	870	
3,3'-Dichlorobenzidine	ND	20	
Benzo(a)anthracene	ND	870	
Chrysene	ND	870	
bis(2-ethylhexyl)phthalate	180	870	B J
Di-n-octyl phthalate	ND	870	
Benzo(b)fluoranthene	ND	870	
Benzo(k)fluoranthene	ND	870	
Benzo(a)pyrene	ND	870	
Indeno(1,2,3-cd)pyrene	ND	870	
Dibenz(a,h)anthracene	ND	870	
Benzo(g,h,i)perylene	ND	870	

ND - Not Detected
PQL - Practical Quantitation Limit

Semi-Volatile Surrogates

Surrogate Compound	Percent Recovery	Control Limits Water	Soil
Nitrobenzene - d_5	33	35 - 114	23 - 120
2-Fluorobiphenyl	56	43 - 116	30 - 115
p-Terphenyl-d_{14}	91	33 - 141	18 - 137
Phenol-d_6	36	10 - 94	24 - 113
2-Fluorophenol	45	21 - 100	25 - 121
2,4,6-Tribromophenol	54	10 - 123	19 - 122

Continued. . . . .

SOUND ANALYTICAL SERVICES, INC.

Burlington Environmental, Technical Services
Project: 624878-7302 Pier 91

Lab No. 29796
March 5, 1993

Lab No. 29796-4 Client ID: CP-106B-18-20 (soil)

TPH Per EPA Method 418.1
Date Extracted: 1-28-93
Date Analyzed: 1-28-93

Parameter	Concentration, mg/kg	Flag
Total Petroleum Hydrocarbons	160	

TPH Per EPA SW-846 Modified Method 8015
Date Extracted: 1-28-93
Date Analyzed: 1-28-93

Parameter	Concentration, mg/kg	Flag
Total Petroleum Fuel Hydrocarbons	170	
TPH as	Aged Gas and Diesel	
SURROGATE RECOVERY, %		
1-chlorooctane	116	
o-terphenyl	130	

SOUND ANALYTICAL SERVICES

Dennis L. Bean

DENNIS L. BEAN

SOUND ANALYTICAL SERVICES, INC.

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206)922-2310 - FAX (206)922-5047

QUALITY CONTROL REPORT

VOLATILE ORGANICS PER EPA METHOD 8240

Client: Burlington Environmental, Technical Services
Lab No: 29796q1a
Units: ug/l
Date: March 5, 1993
Blank No: V8112

METHOD BLANK

Compound	Blank Value	PQL	FLAGS
Chloromethane	ND	10	
Bromomethane	ND	10	
Vinyl Chloride	ND	10	
Chloroethane	ND	10	
Methylene Chloride	7.2	5	
Acetone	4.8	50	J
Carbon Disulfide	ND	5	
1,1-Dichloroethene	ND	5	
1,1-Dichloroethane	ND	5	
1,2-Dichloroethene (Total)	ND	5	
Chloroform	ND	5	
1,2-Dichloroethane	ND	5	
2-Butanone	ND	25	
1,1,1-Trichloroethane	ND	5	
Carbon Tetrachloride	ND	5	
Vinyl Acetate	ND	25	
Bromodichloromethane	ND	5	
1,2-Dichloropropane	ND	5	
Cis-1,3-Dichloropropene	ND	5	
Trichloroethene	ND	5	
Dibromochloromethane	ND	5	
1,1,2-Trichloroethane	ND	5	
Benzene	ND	5	
Trans-1,3-Dichloropropene	ND	5	
Bromoform	ND	5	
4-Methyl-2-Pentanone	ND	25	
2-Hexanone	ND	5	
Tetrachloroethene	ND	5	
1,1,2,2-Tetrachloroethane	ND	5	
Toluene	ND	5	
Chlorobenzene	ND	5	
Ethyl Benzene	ND	5	
Styrene	ND	5	
Total Xylenes	ND	5	

ND - Not Detected
PQL - Practical Quantitation Limit

SOUND ANALYTICAL SERVICES, INC.

QUALITY CONTROL REPORT

VOLATILE ORGANICS PER EPA METHOD 8240

Client: Burlington Environmental, Technical Services
Lab No: 29796q1a
Units: ug/l
Date: March 5, 1993
Blank No: V8112

METHOD BLANK

VOLATILE SURROGATES

Surrogate	Percent Recovery	Control Limits Water	Soil
Toluene - d8	100	86 - 115	81 - 117
Bromofluorobenzene	104	76 - 114	74 - 121
1,2-Dichloroethane d4	97	88 - 110	70 - 121

SOUND ANALYTICAL SERVICES, INC.

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206)922-2310 - FAX (206)922-5047

QUALITY CONTROL REPORT

VOLATILE ORGANICS PER EPA METHOD 8240

Client: Burlington Environmental, Technical Services
Lab No: 29796qc1
Units: ug/kg
Date: March 5, 1993
Blank No: V8237

METHOD BLANK

Compound	Blank Value	PQL	FLAGS
Chloromethane	ND	400	
Bromomethane	ND	400	
Vinyl Chloride	ND	400	
Chloroethane	ND	400	
Methylene Chloride	250	200	
Acetone	64	2,000	J
Carbon Disulfide	ND	200	
1,1-Dichloroethene	ND	200	
1,1-Dichloroethane	ND	200	
1,2-Dichloroethene (Total)	ND	200	
Chloroform	ND	200	
1,2-Dichloroethane	ND	200	
2-Butanone	ND	1,000	
1,1,1-Trichloroethane	ND	200	
Carbon Tetrachloride	ND	200	
Vinyl Acetate	ND	1,000	
Bromodichloromethane	ND	200	
1,2-Dichloropropane	ND	200	
Cis-1,3-Dichloropropene	ND	200	
Trichloroethene	ND	200	
Dibromochloromethane	ND	200	
1,1,2-Trichloroethane	ND	200	
Benzene	ND	200	
Trans-1,3-Dichloropropene	ND	200	
Bromoform	ND	200	
4-Methyl-2-Pentanone	ND	1,000	
2-Hexanone	ND	200	
Tetrachloroethene	ND	200	
1,1,2,2-Tetrachloroethane	ND	200	
Toluene	ND	200	
Chlorobenzene	ND	200	
Ethyl Benzene	ND	200	
Styrene	ND	200	
Total Xylenes	ND	200	

ND - Not Detected
PQL - Practical Quantitation Limit

SOUND ANALYTICAL SERVICES, INC.

QUALITY CONTROL REPORT

VOLATILE ORGANICS PER EPA METHOD 8240

Client: Burlington Environmental, Technical Services
Lab No: 29796qc1
Units: ug/kg
Date: March 5, 1993
Blank No: V8237

METHOD BLANK

VOLATILE SURROGATES

Surrogate	Percent Recovery	Control Limits Water	Control Limits Soil
Toluene - d8	103	86 - 115	81 - 117
Bromofluorobenzene	102	76 - 114	74 - 121
1,2-Dichloroethane d4	105	88 - 110	70 - 121

SOUND ANALYTICAL SERVICES, INC.

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206) 922-2310 - FAX (206) 922-5047

QUALITY CONTROL REPORT

VOLATILE ORGANICS - METHOD 8240

Client: Burlington Environmental, Technical Services
Lab No: 29796q1b
Units: ug/l
Date: March 5, 1993

BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY

	Spike Added	Spike Recovery	% R	Spike Dup. Added	Spike Recovery	% R	RPD
1,1-DCE	55	64	116	55	62	113	3.3
TCE	55	56	102	55	56	102	0.0
Chloro-benzene	55	60	109	55	60	109	0.0
Toluene	55	58	105	55	58	105	0.0
Benzene	55	57	104	55	57	104	0.0

RPD = Relative Percent Difference
= [(BS - BSD) / ((BS + BSD) / 2)] x 100

% REC = Percent Recovery
= [(BS - SAMPLE RESULT) / SPIKE] x 100

ADVISORY LIMITS	RPD	% RECOVERY
1,1-Dichloroethene	22	59 - 172
Trichloroethene	24	62 - 137
Chlorobenzene	21	60 - 133
Toluene	21	59 - 139
Benzene	21	66 - 142

SOUND ANALYTICAL SERVICES, INC.

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206)922-2310 - FAX (206)922-5047

QUALITY CONTROL REPORT

SEMIVOLATILE ORGANICS PER EPA METHOD 8270

Client: Burlington Environmental, Technical Services
Lab No: 29796qc7
Units: ug/l
Date: March 5, 1993
Blank No: SBLK36-s7859

METHOD BLANK

Compound	Blank Value	PQL	Flags
Phenol	ND	10	
bis(2-Chloroethyl) ether	ND	10	
2-Chlorophenol	ND	10	
1,3-Dichlorobenzene	ND	10	
1,4-Dichlorobenzene	ND	10	
Benzyl Alcohol	ND	20	
1,2-Dichlorobenzene	ND	10	
2-Methylphenol	ND	10	
bis(2-Chloroisopropyl)ether	ND	10	
4-Methylphenol	ND	10	
N-Nitroso-Di-N-propylamine	ND	10	
Hexachloroethane	ND	10	
Nitrobenzene	ND	10	
Isophorone	ND	10	
2-Nitrophenol	ND	10	
2,4-Dimethylphenol	ND	10	
Benzoic Acid	ND	50	
bis(2-Chloroethoxy)methane	ND	10	
2,4-Dichlorophenol	ND	10	
1,2,4-Trichlorobenzene	ND	10	
Naphthalene	ND	10	
4-Chloroaniline	ND	20	
Hexachlorobutadiene	ND	10	
4-Chloro-3-methylphenol	ND	20	
2-Methylnaphthalene	ND	10	
Hexachlorocyclopentadiene	ND	10	
2,4,6-Trichlorophenol	ND	10	
2,4,5-Trichlorophenol	ND	10	
2-Chloronaphthalene	ND	10	
2-Nitroaniline	ND	50	
Dimethyl phthalate	ND	10	
Acenaphthylene	ND	10	

Continued . . . . .

SOUND ANALYTICAL SERVICES, INC.

SEMIVOLATILE ORGANICS PER EPA METHOD 8270

Client: Burlington Environmental, Technical Services
Lab No: 29796qc7
Units: ug/l
Date: March 5, 1993
Blank No: SBLK36-s7859

METHOD BLANK

Compound	Blank Value	PQL	Flags
3-Nitroaniline	ND	50	
Acenaphthene	ND	10	
2,4-Dinitrophenol	ND	50	
4-Nitrophenol	ND	50	
Dibenzofuran	ND	10	
2,4-Dinitrotoluene	ND	10	
2,6-Dinitrotoluene	ND	10	
Diethylphthalate	ND	10	
4-Chlorophenyl phenyl ether	ND	10	
Fluorene	ND	10	
4-Nitroaniline	ND	50	
4,6-Dinitro-2-methylphenol	ND	50	
N-Nitrosodiphenylamine	ND	10	
4-Bromophenyl phenyl ether	ND	10	
Hexachlorobenzene	ND	10	
Pentachlorophenol	ND	50	
Phenanthrene	ND	10	
Anthracene	ND	10	
Di-n-butylphthalate	ND	10	
Fluoranthene	ND	10	
Pyrene	ND	10	
Butyl benzyl phthalate	ND	10	
3,3'-Dichlorobenzidine	ND	20	
Benzo(a)anthracene	ND	10	
bis(2-ethylhexyl)phthalate	ND	10	
Chrysene	ND	10	
Di-n-octyl phthalate	ND	10	
Benzo(b)fluoranthene	ND	10	
Benzo(k)fluoranthene	ND	10	
Benzo(a)pyrene	ND	10	
Indeno(1,2,3-cd)pyrene	ND	10	
Dibenz(a,h)anthracene	ND	10	
Benzo(g,h,i)perylene	ND	10	

Continued. . . .

SOUND ANALYTICAL SERVICES, INC.

QUALITY CONTROL REPORT

SEMIVOLATILE ORGANICS PER EPA METHOD 8270

Client: Burlington Environmental, Technical Services
Lab No: 29796qc7
Units: ug/l
Date: March 5, 1993
Blank No: SBLK36-s7859

ND - Not Detected.

PQL - Practical Quantitation Limit

SEMIVOLATILE SURROGATES

Surrogate	Percent Recovery	Control Limits Water	Soil
Nitrobenzene - d5	84	35 - 114	23 - 120
2-Fluorobiphenyl	70	43 - 116	30 - 115
p-Terphenyl-d14	84	33 - 141	18 - 137
Phenol-d6	27	10 - 94	24 - 113
2-Fluorophenol	51	21 - 100	25 - 121
2,4,6-TBP	81	10 - 123	19 - 122

SOUND ANALYTICAL SERVICES, INC.

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206)922-2310 - FAX (206)922-5047

QUALITY CONTROL REPORT

SEMIVOLATILE ORGANICS PER EPA METHOD 8270

Client: Burlington Environmental, Technical Services
Lab No: 29796qc5
Units: ug/kg
Date: March 5, 1993
Blank No: SBLK37-57860

METHOD BLANK

Compound	Blank Value	PQL	Flags
Phenol	ND	670	
bis(2-Chloroethyl) ether	ND	670	
2-Chlorophenol	ND	670	
1,3-Dichlorobenzene	ND	670	
1,4-Dichlorobenzene	ND	670	
Benzyl Alcohol	ND	1,300	
1,2-Dichlorobenzene	ND	670	
2-Methylphenol	ND	670	
bis(2-Chloroisopropyl)ether	ND	670	
4-Methylphenol	ND	670	
N-Nitroso-Di-N-propylamine	ND	670	
Hexachloroethane	ND	670	
Nitrobenzene	ND	670	
Isophorone	ND	670	
2-Nitrophenol	ND	670	
2,4-Dimethylphenol	ND	670	
Benzoic Acid	ND	3,300	
bis(2-Chloroethoxy)methane	ND	670	
2,4-Dichlorophenol	ND	670	
1,2,4-Trichlorobenzene	ND	670	
Naphthalene	ND	670	
4-Chloroaniline	ND	1,300	
Hexachlorobutadiene	ND	670	
4-Chloro-3-methylphenol	ND	1,300	
2-Methylnaphthalene	ND	670	
Hexachlorocyclopentadiene	ND	670	
2,4,6-Trichlorophenol	ND	670	
2,4,5-Trichlorophenol	ND	670	
2-Chloronaphthalene	ND	670	
2-Nitroaniline	ND	3,300	
Dimethyl phthalate	ND	670	
Acenaphthylene	ND	670	

Continued . . . . .

SOUND ANALYTICAL SERVICES, INC.

SEMIVOLATILE ORGANICS PER EPA METHOD 8270

Client: Burlington Environmental, Technical Services
Lab No: 29796qc5
Units: ug/kg
Date: March 5, 1993
Blank No: SBLK37-57860

METHOD BLANK

Compound	Blank Value	PQL	Flags
3-Nitroaniline	ND	3,300	
Acenaphthene	ND	670	
2,4-Dinitrophenol	ND	3,300	
4-Nitrophenol	ND	3,300	
Dibenzofuran	ND	670	
2,4-Dinitrotoluene	ND	670	
2,6-Dinitrotoluene	ND	670	
Diethylphthalate	ND	670	
4-Chlorophenyl phenyl ether	ND	670	
Fluorene	ND	670	
4-Nitroaniline	ND	3,300	
4,6-Dinitro-2-methylphenol	ND	3,300	
N-Nitrosodiphenylamine	ND	670	
4-Bromophenyl phenyl ether	ND	670	
Hexachlorobenzene	ND	670	
Pentachlorophenol	ND	3,300	
Phenanthrene	ND	670	
Anthracene	ND	670	
Di-n-butylphthalate	ND	670	
Fluoranthene	ND	670	
Pyrene	ND	670	
Butyl benzyl phthalate	ND	670	
3,3'-Dichlorobenzidine	ND	1,300	
Benzo(a)anthracene	ND	670	
bis(2-ethylhexyl)phthalate	670	670	
Chrysene	ND	670	
Di-n-octyl phthalate	ND	670	
Benzo(b)fluoranthene	ND	670	
Benzo(k)fluoranthene	ND	670	
Benzo(a)pyrene	ND	670	
Indeno(1,2,3-cd)pyrene	ND	670	
Dibenz(a,h)anthracene	ND	670	
Benzo(g,h,i)perylene	ND	670	

Continued. . . .

SOUND ANALYTICAL SERVICES, INC.

QUALITY CONTROL REPORT

SEMIVOLATILE ORGANICS PER EPA METHOD 8270

Client: Burlington Environmental, Technical Services
Lab No: 29796qc5
Units: ug/kg
Date: March 5, 1993
Blank No: SBLK37-57860

ND - Not Detected.

PQL - Practical Quantitation Limit

SEMIVOLATILE SURROGATES

Surrogate	Percent Recovery	Control Limits Water	Soil
Nitrobenzene - d5	78	35 - 114	23 - 120
2-Fluorobiphenyl	77	43 - 116	30 - 115
p-Terphenyl-d14	86	33 - 141	18 - 137
Phenol-d6	37	10 - 94	24 - 113
2-Fluorophenol	67	21 - 100	25 - 121
2,4,6-TBP	45	10 - 123	19 - 122

SOUND ANALYTICAL SERVICES, INC.

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206) 922-2310 - FAX (206) 922-5047

MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY

Client Name: Burlington Environmental, Technical Services
Lab No: 29796qc6
Date: March 5, 1993
MS/MSD No. 29796-1
Matrix: Water

SEMI-VOLATILE ORGANICS

COMPOUND	SPIKE (ug/l)	SAMPLE RESULT	CONC MS	% REC	CONC MSD	% REC	RPD	FLAGS
Phenol	100	ND	20	20	20	20	0.0	
2-Chlorophenol	100	ND	57	57	52	52	9.2	
1,4-Dichlorobenzene	100	ND	48	48	50	50	4.1	
N-nitrosodi-n-Propylamine	100	ND	62	62	62	62	0.0	
1,2,4-Trichlorobenzene	100	ND	48	48	51	51	6.1	
4-Chloro-3-Methylphenol	100	ND	46	46	46	46	0.0	
Acenaphthene	100	ND	56	56	56	56	0.0	
4-Nitrophenol	100	ND	16	16	16	16	0.0	
2,4 Dinitrotoluene	100	ND	56	56	57	57	1.8	
Pentachlorophenol	100	ND	51	51	47	47	8.2	
Pyrene	100	ND	64	64	65	65	1.6	

RPD = Relative Percent Difference
% REC = Percent Recovery

ADVISORY LIMITS:	RPD	% RECOVERY
Phenol	35	26 - 90
2-Chlorophenol	50	25 - 102
1,4-Dichlorobenzene	27	28 - 104
N-nitrosodi-n-Propylamine	38	41 - 126
1,2,4-Trichlorobenzene	23	38 - 107
4-Chloro-3-Methylphenol	33	26 - 103
Acenaphthene	19	31 - 137
4-Nitrophenol	50	11 - 114
2,4 Dinitrotoluene	47	28 - 89
Pentachlorophenol	47	17 - 109
Pyrene	36	35 - 142

SOUND ANALYTICAL SERVICES, INC.

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206) 922-2310 - FAX (206) 922-5047

MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY

Client Name: Burlington Environmental, Technical Services
Lab No: 29796qc4
Date: March 5, 1993
MS/MSD No. 29796-4
Matrix: Soil

SEMI-VOLATILE ORGANICS

COMPOUND	SPIKE (ug/kg)	SAMPLE RESULT	CONC MS	% REC	CONC MSD	% REC	RPD	FLAGS
Phenol	4,400	ND	1,600	36	1,900	43	11.0	
2-Chlorophenol	4,400	ND	1,700	39	1,900	43	17.0	
1,4-Dichlorobenzene	4,400	ND	680	15	610	14	6.9	
N-nitrosodi-n-Propylamine	4,400	ND	2,700	61	2,300	52	16.0	
1,2,4-Trichlorobenzene	4,400	ND	1,500	34	1,500	34	0.0	
4-Chloro-3-Methylphenol	4,400	ND	1.700	39	2,100	48	6.1	
Acenaphthene	4,400	ND	2,900	66	2,600	39	11.0	
4-Nitrophenol	4,400	ND	2,400	55	3,100	70	24.0	
2,4 Dinitrotoluene	4,400	ND	2,400	55	2,300	52	5.6	
Pentachlorophenol	4,400	ND	1,500	34	2,000	45	28.0	
Pyrene	4,400	ND	3,300	75	3,100	70	6.9	

RPD = Relative Percent Difference
% REC = Percent Recovery

ADVISORY LIMITS:	RPD	% RECOVERY
Phenol	35	26 - 90
2-Chlorophenol	50	25 - 102
1,4-Dichlorobenzene	27	28 - 104
N-nitrosodi-n-Propylamine	38	41 - 126
1,2,4-Trichlorobenzene	23	38 - 107
4-Chloro-3-Methylphenol	33	26 - 103
Acenaphthene	19	31 - 137
4-Nitrophenol	50	11 - 114
2,4 Dinitrotoluene	47	28 - 89
Pentachlorophenol	47	17 - 109
Pyrene	36	35 - 142

SOUND ANALYTICAL SERVICES, INC.

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206) 922-2310 - FAX (206) 922-5047

QUALITY CONTROL REPORT

Total Petroleum Fuel Hydrocarbons
by Method 8015

Client: Burlington Environmental, Technical Services
Lab No: 29796qc3
Matrix: Soil
Units: mg/kg
Date: March 5, 1993

DUPLICATE

Dup. No. 29796-4

Parameter	Sample(S)	Duplicate(D)	RPD
Total Petroleum Fuel Hydrocarbons	170	150	13
SURROGATE RECOVERY%			
1-chlorooctane	116	103	
o-terphenyl	130	123	

RPD = relative percent difference
= [(S - D) / ((S + D) / 2)] x 100

MATRIX SPIKE RECOVERY

MSD No. 29796-4

Parameter	Sample Result (SR)	Spiked Sample Result (MS)	Spike Added (SA)	%R	Flag
Total Petroleum Fuel Hydrocarbons	170	460	402	72	

%R = Percent Recovery
= [(MS - SR) / SA] x 100

SOUND ANALYTICAL SERVICES, INC.

QUALITY CONTROL REPORT

Total Petroleum Fuel Hydrocarbons
by Method 8015

Client: Burlington Environmental, Technical Services
Lab No: 29796qc3
Matrix: Soil
Units: mg/kg
Date: March 5, 1993

BLANK SPIKE RECOVERIES

BS No. 004F0101.D

Parameter	Spike Added	Spike Recovered	%R
Total Petroleum Fuel Hydrocarbons	402	397	99

BS No. 008R0101.D

Parameter	Spike Added	Spike Recovered	%R
Total Petroleum Fuel Hydrocarbons	402	437	109

%R = Percent Recovery
= [(MS - SR) / SA] x 100

SOUND ANALYTICAL SERVICES, INC.

QUALITY CONTROL REPORT

Total Petroleum Fuel Hydrocarbons
by Method 8015

Client: Burlington Environmental, Technical Services
Lab No: 29796qc3
Units: mg/l
Date: March 5, 1993

METHOD BLANKS

Blank No. 023R0101.D

Parameter	Blank Value
Total Petroleum Fuel Hydrocarbons	< 0.75
SURROGATE RECOVERY%	
1-chlorooctane	40
o-terphenyl	122

Blank No. 003F0101.D

Parameter	Blank Value
Total Petroleum Fuel Hydrocarbons	< 10
SURROGATE RECOVERY%	
1-chlorooctane	100
o-terphenyl	100

SOUND ANALYTICAL SERVICES, INC.

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206) 922-2310 - FAX (206) 922-5047

QUALITY CONTROL REPORT

Total Petroleum Hydrocarbons
by Method 418.1

Client: Burlington Environmental, Technical Services
Lab No: 29796qc2
Date: March 5, 1993

METHOD BLANKS

Matrix: Soil — Units: mg/kg

Parameter	Blank Value
Total Petroleum Hydrocarbons	< 10

Matrix: Water — Units: mg/l

Parameter	Blank Value
Total Petroleum Hydrocarbons	< 1.0

DUPLICATE

Dup No. 29806-2 Batch QC — Units: mg/kg

Parameter	Sample(S)	Duplicate(D)	RPD	Flags
Total Petroleum Hydrocarbons	60	58	3.4	

RPD = Relative Percent Difference
= [(S - D) / ((S + D) / 2] x 100

SOUND ANALYTICAL SERVICES, INC.

QUALITY CONTROL REPORT

Total Petroleum Hydrocarbons
by Method 418.1

Client: Burlington Environmental, Technical Services
Lab No: 29796qc2
Date: March 5, 1993

BLANK SPIKE RECOVERY

Matrix: Water — Units: mg/l

Parameter	Spike Recovered (SR)	Spike Added (SA)	%R	Flag
Total Petroleum Hydrocarbons	101	77	76	

Matrix: Soil — Units: mg/kg

Parameter	Spike Recovered (SR)	Spike Added (SA)	%R	Flag
Total Petroleum Hydrocarbons	202	183	90	

%R = Percent Recovery
= (SR / SA) x 100

SOUND ANALYTICAL SERVICES, INC.

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206) 922-2310 - FAX (206) 922-5047

DATA QUALIFIER FLAGS

ND: Indicates that the analyte was analyzed for but was not detected. The associated numerical value is the practical quantitation limit, corrected for sample dilution.

J: The analyte was analyzed for and positively identified, but the associated numerical value is an estimated quantity.

C: The identification of this analyte was confirmed by GC/MS.

B1: This analyte was also detected in the associated method blank. The reported sample results have been adjusted for moisture, final exract volume, and/or dilutions performed during extract preparation. The analyte concentration was evaluated prior to sample preparation adjustments, and was determined not to be significantly higher than the associated method blank (less than ten times the concentration reported in the blank).

B2: This analyte was also detected in the associated method blank. However, the analyte concentration in the sample was determined to be significantly higher than the method blank (greater than ten times the concentration reported in the blank).

E: The concentration of this analyte exceeded the instrument calibration range.

D: The reported result for this analyte is calculated based on a secondary dilution factor.

A: This TIC is a suspected aldol-condensation product.

M: Quantitation Limits are elevated due to matrix interferences.

S: The calibration quality control criteria for this compound were not met. The reported concentration should be considered an estimated quantity.

X1: Contaminant does not appear to be "typical" product. Elution pattern suggests it may be _____.

X2: Contaminant does not appear to be "typical" product. Further testing is suggested for identification.

X3: Identification and quantification of peaks was complicated by matrix interference; GC/MS confirmation is recommended.

X4: RPD for duplicates outside QC limits. Sample was re-analyzed with similar results. Sample matrix is nonhomogeneous.

X4a: RPD for duplicates outside QC limits due to analyte concentration near the method practical quantitation limit/detection limit.

X5: Matrix spike was diluted out during analysis.

X6: Recovery of matrix spike outside QC limits. Sample was re-analyzed with similar results.

X7: Recovery of matrix spike outside QC limits. Matrix interference is indicated by blank spike recovery data.

X7a: RPD value for MS/MSD outside QC limits due to high contaminant levels.

X8: Surrogate was diluted out during analysis.

X9: Surrogate recovery outside QC limits due to matrix composition.

X10: Surrogate recovery outside QC limits due to high contaminant levels.

CHAIN OF CUSTODY

BURLINGTON
ENVIRONMENTAL

210 West Sand Bank Road
P.O. Box 330
Columbia, IL 62236-0330
618/281-7173
618/281-5120 FAX

CHAIN-OF-CUSTODY RECORD

C.O.C. SERIAL NO. 6086

PROJECT NAME BEI Pier 91 RFI
PROJECT NUMBER 624578 MAJOR TASK 7304
SAMPLERS J. Pence
LAB DESTINATION S.A.S.

SAMPLE NO.	DATE	TIME	COMP	GRAB	SAMPLE LOCATION	NO. OF CONTAINERS	TYPE OF ANALYSIS: 8270 BNA	8240 VOC	TPH 418.1	TPH 8015	ICED	PRESERVATIVES: CHEMICALS ADDED	REMARKS (CHEMICAL ANALYSIS REQUEST FORM NUMBER IF APPLICABLE)
	1/23/93	1345			CP-122A-DW	5	↓	↓	↓	↓	↓		
	1/25/93	1325			CP-106B-2-4	2							
	↓	1345			CP-106B-6-8	2							
	↓	1540			CP-106B-18-20	2							

RELINQUISHED BY

SIGNATURE	DATE	TIME
J. Palmy	1/26	1020
J. Palmy	1/26	1230P

RECEIVED BY

SIGNATURE	DATE	TIME
J. Palmy	1/26	1020
D. Nguyen		

SHIPPING NOTES

LAB NOTES

BE-34 (1/92)